What is claimed is:

1. A method for communicating a data stream, the method comprising the steps of,

generating a sequence of data symbols from the data stream,

precoding the sequence of data symbols into a sequence of precoded data symbols,

modulating the sequence of precoded data symbols into a continuous phase modulated signal,

transmitting the continuous phase modulated signal,

receiving the continuous phase modulated signal,

demodulating the continuous phase modulated signal into a received baseband signal, and

filtering the received baseband signal into a sequence of filtered signals having absolute phase for indicating the sequence of data symbols.

2. The method of claim 1 further comprising the steps of ,

sampling the sequence of filtered signals into a sequence of sampled signals, and

decoding the sequence of sampled signals into an estimated data stream.

///

3. The method of claim 1 wherein,

the generating step comprises the steps of receiving the data stream of data bits, formatting the data stream into the sequence of formatted data pulses as a sequence data symbols within an M-ary symbol set,

the modulating step comprises the steps of Gaussian filtering and frequency modulating for generating the continuous phase modulated signal, the Gaussian filter step filters the precoded sequence of data symbols into pulse responses continuously accumulated over a finite memory time as a filter response, the Gaussian filtering step is defined by a bandwidth time product inversely defining the finite memory time, the frequency modulating step frequency modulates a carrier reference by the filter response by a modulation index for converting the filter response into the continuous phase modulated signal,

the demodulating step is carrier demodulating step for demodulating the continuous phase modulated signal using a local carrier into the baseband signal, the carrier demodulating step further removes a carrier phase offset between the local carrier and the received continuous phase modulated signal, and

the filtering step is a matched filtering step for matched filtering of the received baseband signal into the filtered signal, the matched filtering is matched by pulse amplitude modulation representation to the Gaussian filtering step, the filtered signal has an absolute phase at a periodic sampling time for indicating the sequence of data symbols.

4. The method of claim 3 wherein the modulating step, the modulation index is equal to a fraction selected from a group consisting of 1/M and 1-1/M for the M-ary symbol set.

5. A method for communicating data stream, the method comprising the steps of,

generating a sequence data symbols from the data stream by formatting the data stream into the sequence of formatted data pulses as a sequence data symbols within an 2-ary symbol set,

precoding the sequence of data symbols into a sequence of precoded data symbols,

Gaussian filtering the precoded sequence of data symbols into pulse responses continuously accumulated over a finite memory time as a filter response, the Gaussian filtering is defined by a bandwidth time product inversely defining the finite memory time,

frequency modulating a carrier reference by the filter response by a modulation index for converting the filter response into the continuous phase modulated signal,

demodulating the continuous phase modulated signal by a local carrier and by a carrier phase offset into a received baseband signal, and

matched filtering the received baseband signal into a filtered signal, the matched filtering is matched by pulse amplitude modulation representation to the Gaussian filtering, the filtered signal has an absolute phase at a periodic sampling time for indicating the sequence of symbols.

6. The method of claim 5, wherein,

the sequence of data symbols has a data symbol d_n at a current symbol time n and has a data symbol d_{n-1} at an immediate previous symbol time n-1 for precoding the data sequence into the sequence precoded data symbols having a precoded data symbol α_n at the current symbol time, the precoding step is defined by $\alpha_n = [\ d_n - d_{n-1} + 1\ ]_{mod4}$.

7. The method of claim 5, wherein,

the sequence of data symbols has a data symbol d_n at a current symbol time n and has a data symbol d_{n-1} at an immediate previous symbol time n-1 for precoding the data sequence into the sequence of precoded data symbols having a precoded data symbol α_n at the current symbol time for even symbol times and for odd symbol times, the precoding step is defined by $\alpha_n = [\ d_n - d_{n-1} + 1\ ]_{mod4}$ for even symbol times and $\alpha_n = -[\ d_n - d_{n-1} + 1\ ]_{mod4}$ for odd symbol times.

8. The method of claim 5 wherein the modulation index is 1/2.

9. The method of claim 5 wherein the bandwidth time product is 1/3.

10. The method of claim 5 wherein the filtering step is a matched filtering step for applying a principal Laurent function to the baseband signal so that the filtered signal comprises a principal Laurent component.

11. A method for communicating data stream, the method comprising the steps of,

generating a sequence data symbols from the data stream by formatting the data stream into the sequence of formatted data pulses as a sequence data symbols within an 4-ary symbol set,

precoding the sequence of data symbols into a sequence of precoded data symbols,

Gaussian filtering the precoded sequence of data symbols into pulse responses continuously accumulated over a finite memory time as a filter response, the Gaussian filtering is defined by a bandwidth time product inversely defining the finite memory time,

frequency modulating a carrier reference by the filter response by a modulation index for converting the filter response into the continuous phase modulated signal,

demodulating the continuous phase modulated signal by a local carrier and by a carrier phase offset into a received baseband signal, and

matched filtering the received baseband signal into a filtered signal, the matched filtering is matched by pulse amplitude modulation representation to the Gaussian filtering, the filtered signal has an absolute phase at a periodic sampling time for indicating the sequence of symbols.

12. The method of claim 11, wherein,

the sequence of data symbols has a data symbol d_n at a current symbol time n and has a data symbol d_{n-1} at an immediate previous symbol time n-1 for precoding the data sequence into the sequence precoded data symbols having a precoded data symbol α_n at the

current symbol time, the precoding step is defined by $\alpha_n = [\ d_n - d_{n-1} + 1\ ]_{mod8}$.

13. The method of claim 12 wherein the precoded data symbol α_n is defined by the 4-ary symbol set of +1, -1, +3 and -3.

14. The method of claim 12 wherein the modulation index is 1/4.

15. The method of claim 11, wherein,

the sequence of data symbols has a data symbol d_n at a current symbol time n and has a data symbol d_{n-1} at an immediate previous symbol time n-1 for precoding the data sequence into the sequence precoded data symbols having a precoded data symbol α_n at the current symbol time, the precoding step is defined by $\alpha_n = [\ d_n - d_{n-1} + 3\ ]_{mod8}$.

16. The method of claim 15 wherein the precoded data symbol α_n is defined by the 4-ary symbol set of +1, -1, +3 and -3.

17. The method of claim 15 wherein the modulation index is 1/4.

18. The method of claim 11 wherein 10 wherein the filtering step is a matched filtering step for applying a principal Laurent function, a third Laurent function and a twelfth Laurent function to the baseband signal so that the filtered signal comprises a principal Laurent component, a third Laurent component and a twelfth Laurent component.

19. The method of claim 11 wherein the modulation index is 3/4.

20. The method of claim 11 wherein the bandwidth time product is 1/3.

///